



*Global Automobile Components
Manufacturer*

Woosu Automotive System

June. 2021

Global Automobile
Components Manufacturer

WOOSU AMS

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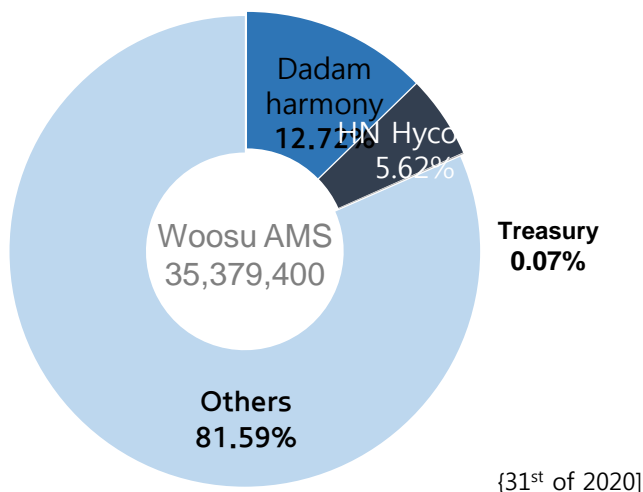
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1-1. Introduction _ Woosu AMS Summary and Subsidiary Information

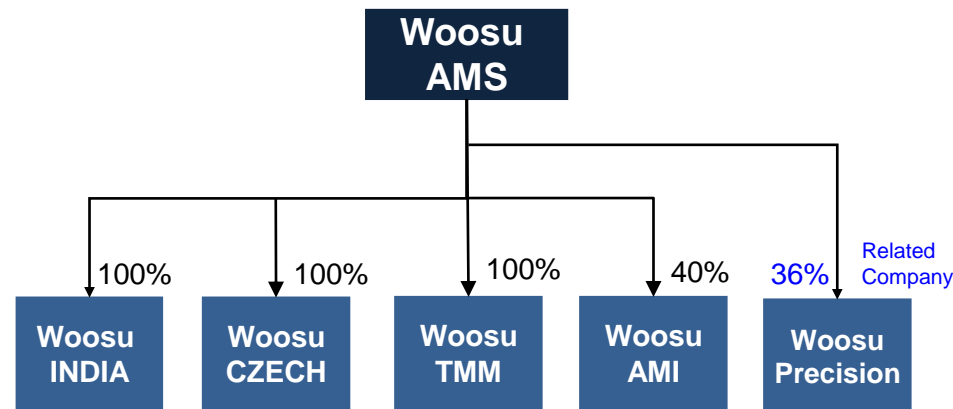
Summary

Company Name	Woosu AMS Co., Ltd.
Foundation	1983' / Seongsan-Gu, Changwon-Si, Korea
President	Sun-Woo, Kim
Type of Company	Listed in KOSDAQ (Outstanding enterprise)
Employee	392 Persons (May 2021)
Main business	Production of Automobile Components
Capital	USD 11Million
Sales	\$230Million / Group Total : \$314Million

Shareholders



Subsidiary and related Company (Q4 2020)



Location

• Chennai India • Senov Czech • Ulsan, Korea • Hwasung, Korea • Ulsan, Korea

Foundation

• Oct. 2007 • Apr. 2012 • Mar. 2018 • Nov. 1994 • Oct. 2007

Products

• Fork & Rail • Fork & Rail • Micro EV • Hub Cluster • CSC
 • Diff. Assy • CSC • EV Motor • Lamp, Mirror • Parking Rod Assy
 • Spider Assy • EV Components

Capital

• \$34Million • \$4.2Million • \$3.1Million • \$27Million • \$53Million

Sales

• \$41Million • \$7.4Million • \$0.4Million • \$36Million • \$84Million

1-2. Company History

Continuous Growth with Vehicle Market in Korea Based on 37 Years of Experience & Know-How

1983-1995

1983.02 Establishment of Woosu Machinery

1988.12 Appointed as a supplier of HMC

1991.05 Appointed as a supplier of DMC

1999.08 Appointed as a supplier of Renault Samsung

1995.05 Corporate conversion

2008~2012

2008.05 Awarded The Order of Industrial Service Merit

2009.09 TA for Air Compressor (Sanwa Seiki in Japan)

2012.05 Establishment of WOOSU CZECH

2012.06 Establishment of Ulsan Factory(AMS / Precision)

2012.12 Awarded \$100Million tower of export

2019~2020

2019.04 Nominated as a supplier of DIFF. from PSA

2019.08 Establishment of second india factory

2019.12 Merged Woosu TMM

2020.04 Staring National Project KEIT xEV

2020.06 MOU TMM & Ulsan City

2020.09 Approval Business Reshuffle Plan

2020.12 Merged Woosu AMI

2000-2007

2000.03 Establishment of R&D Center

2003.02 Listed in KOSDAQ Stock Market

2004.06 Relocation of H/Q [Haman -> Changwon]

2007.04 Changing Company Name (Woosu AMS)

2007.09 Establishment of Woosu Precision

2007.12 Establishment of Woosu India (Chennai)

2015~2018

2015.07. Establishment Woosu Casco (AL Die Casting)

2015.12. Establishment of Woosu Precision Main office(AL Die Casting)

2016.07 Nominated as a supplier for Rotor Shaft from GM

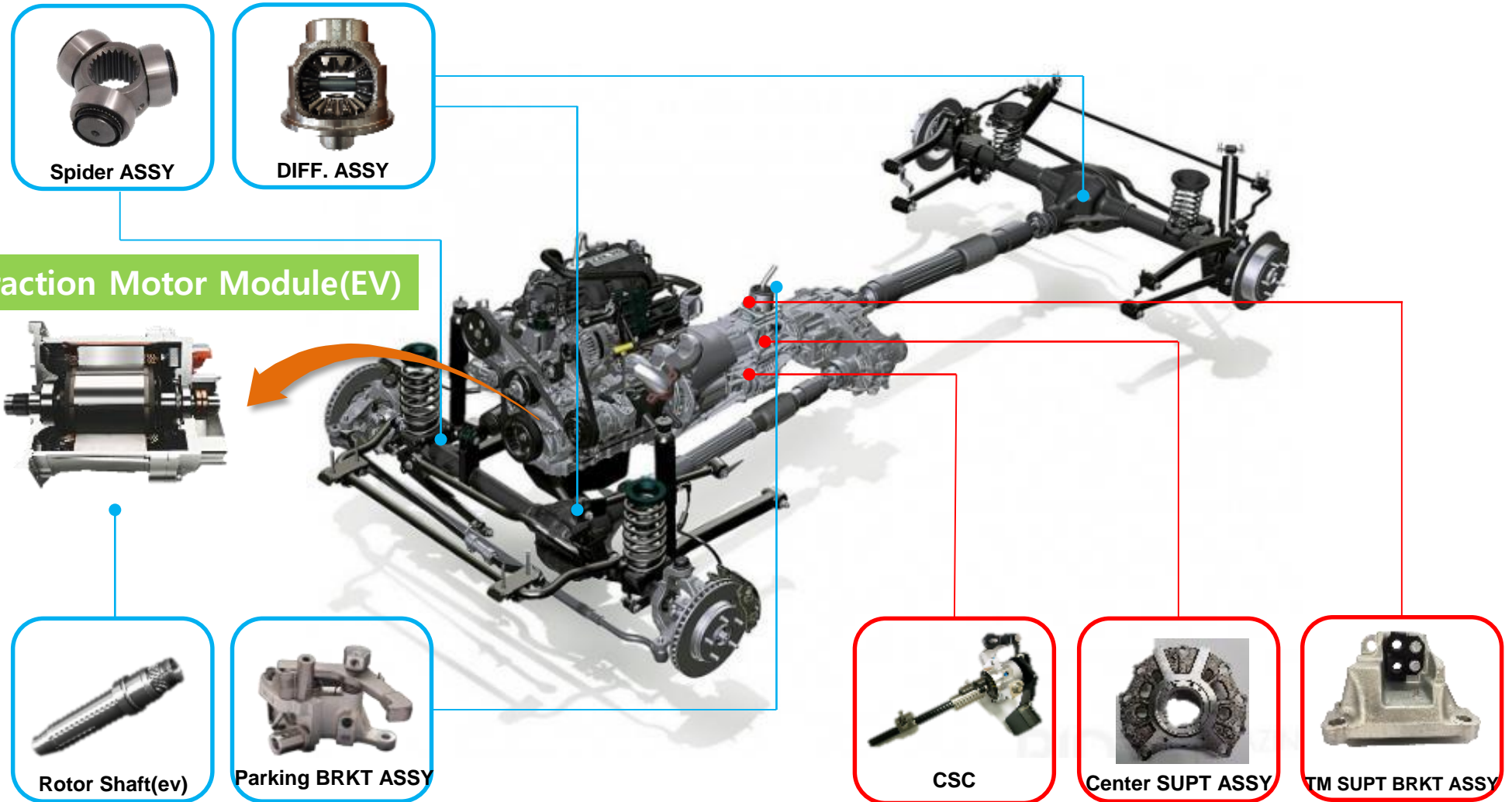
2016.08 Awarded GM Supplier Quality Excellence Awards

2017.08 Nominated as supplier of DIFF. from VW

2018.07 Nominated as a supplier of CSC & Fork from PSA

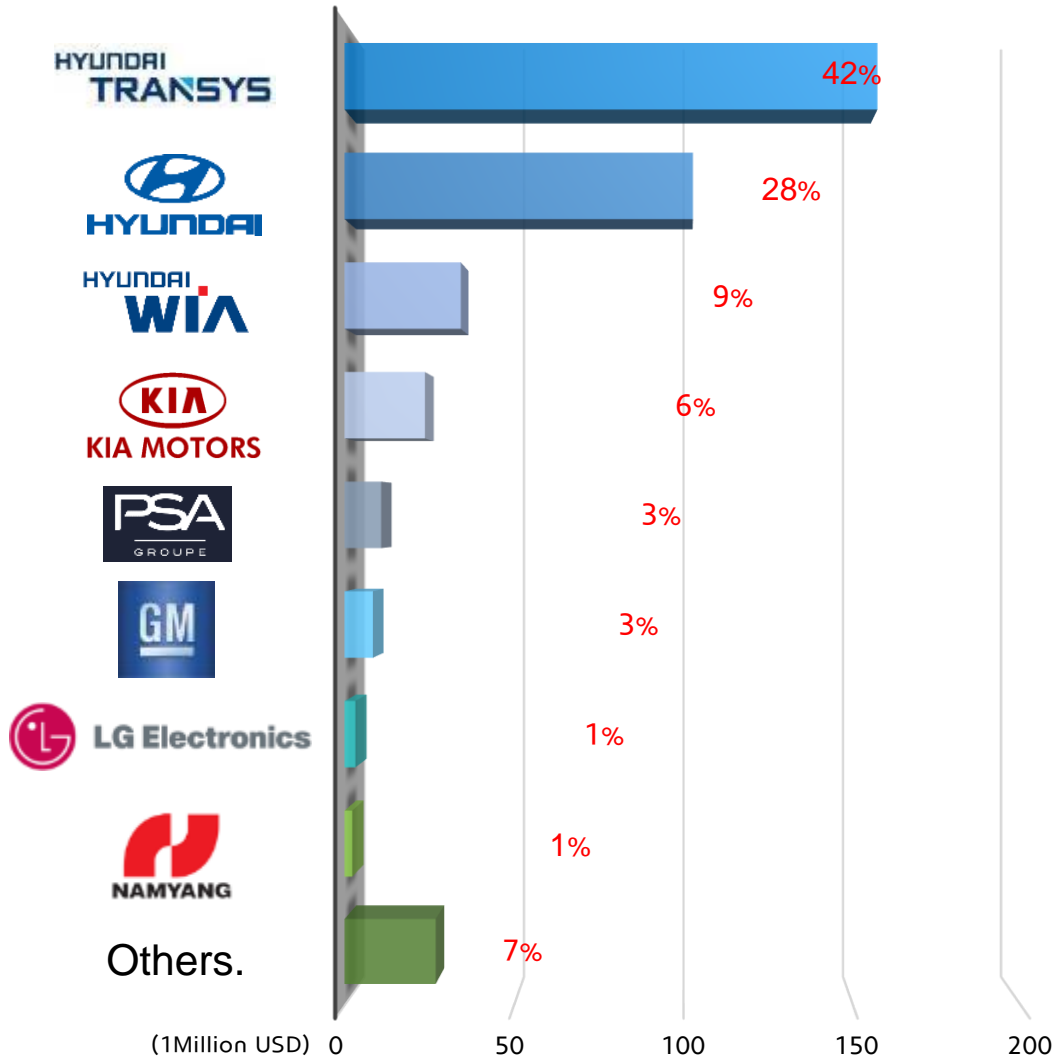
1-3. Major production parts

'Transmission & Motor & Engine' Parts ▶ supplied to domestic and foreign Major Car Makers.

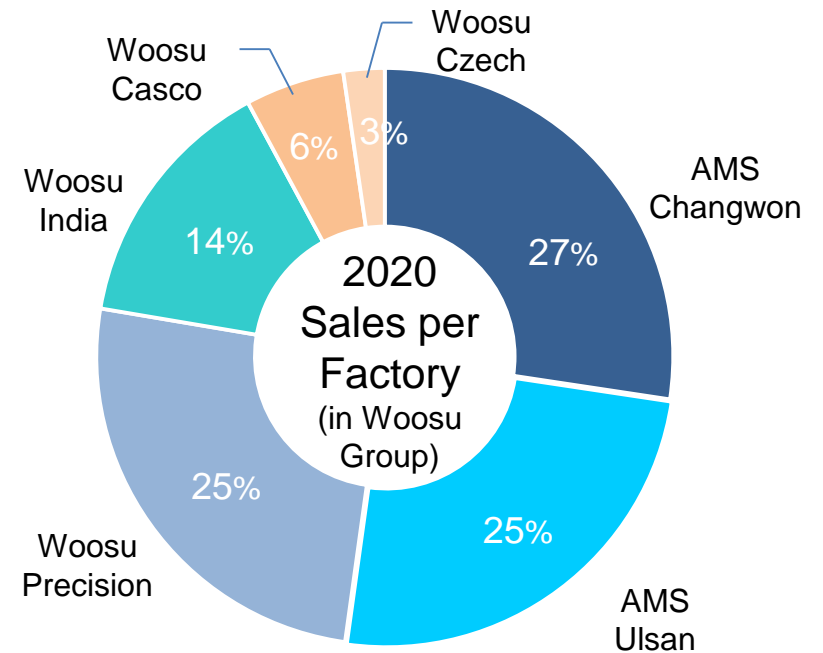


1-4. Sales for major Customers

Classification per Customer (2020)



Classification per Factory (2020)



1-5. Global Customers



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2-1. Woosu AMS Changwon _ Introduction



Foundation	5 Feb. 1983 / Changwon Korea							
Major Customers (Share)	HKMC	84.5%						
	GMK	8.7%						
	LGE	3.0%						
	Others	3.8%						
Sales (1 Million USD)	<table border="1"> <tr> <td>2018</td> <td>2019</td> <td>2020(F)</td> </tr> <tr> <td>89</td> <td>100</td> <td>101</td> </tr> </table>		2018	2019	2020(F)	89	100	101
2018	2019	2020(F)						
89	100	101						

DIFF. ASSY

DIFF. CASE

Rotor Shaft

Air Compressor

Carrier Plate

Adaptor W/outlet



2-2. Woosu AMS Ulsan _ Introduction



Foundation	5 Sep. 2007 / Ulsan Korea							
Major Customers (Share)	HKMC	82.9%						
	Bando Korea	7.3%						
	Others	9.8%						
Sales (1 Million USD)	<table border="1"> <tr> <td>2018</td> <td>2019</td> <td>2020(F)</td> </tr> <tr> <td>92</td> <td>88</td> <td>92</td> </tr> </table>		2018	2019	2020(F)	92	88	92
2018	2019	2020(F)						
92	88	92						

TM SUPT BRKT ASSY

Hub-4&OD Clutch

Hub ASSY 35R Clutch

Chamber-U/D Brake

Piston L/R Brake

Center SUPT ASSY



2-3. Woosu Casco _ Introduction



TM SUPT BRKT



Hub-35R Clutch



Cover Housing



Melting



Die-Casting M/C



Foundation	30 Nov. 2015 / Ulsan Korea							
Major Customers (Share)	HKMC	95%						
	Others	5%						
Sales (1 Million USD)	<table border="1"> <tr> <td>2018</td> <td>2019</td> <td>2020(F)</td> </tr> <tr> <td>17</td> <td>17</td> <td>21</td> </tr> </table>		2018	2019	2020(F)	17	17	21
2018	2019	2020(F)						
17	17	21						

Equipment	Maker	Specification	Qty	Capacity/Year
Die-Casting Machine	BUEHLER	850ton	8	2,208,000
	TOSHIBA	350ton	2	1,400,000
Melting furnace	SJ Ind.	1ton/Hr	2	-
GBF Equipment	SJ Ind.	Nitrogen/Dross	5	-
Nitrogen Generator	Ere Tech	10m ³ /Hr	1	-
High-vacuum Equipment	Daegi Ind.	10,000L/Min	10	-
Super Cooler	Daegi Ind.	25 Bar	10	-
GRAND TOTAL			-	3,608,000

2-4. Woosu India _ Introduction



Foundation	20 Sep. 2007 / Chennai India	
Major Customers (Share)	HMI/HMMC	65.1%
	KMI	17.5%
	PSA	16.8%
	Nexteer	0.6%
Sales (1 Million USD)	40	40
	2018	2019
	53	2020(F)

CSC

Spider ASSY

Sub Module ASSY

Selection Lever

DIFF. ASSY

Input/Output Shaft



2-5. Woosu Precision Main Office _ Introduction



Foundation	18 Dec. 2015 / Ulsan Korea									
Major Customers (Share)	HKMC	92%								
	Orient	8%								
Sales (1 Million USD)	<table border="1"> <tr> <th>Year</th> <th>Sales (1 Million USD)</th> </tr> <tr> <td>2018</td> <td>28</td> </tr> <tr> <td>2019</td> <td>28</td> </tr> <tr> <td>2020(F)</td> <td>29</td> </tr> </table>		Year	Sales (1 Million USD)	2018	28	2019	28	2020(F)	29
Year	Sales (1 Million USD)									
2018	28									
2019	28									
2020(F)	29									

TM SUPT BRKT



L/R Brake-Piston



BRKT AUX MTG Middle



AL Heat Treatment

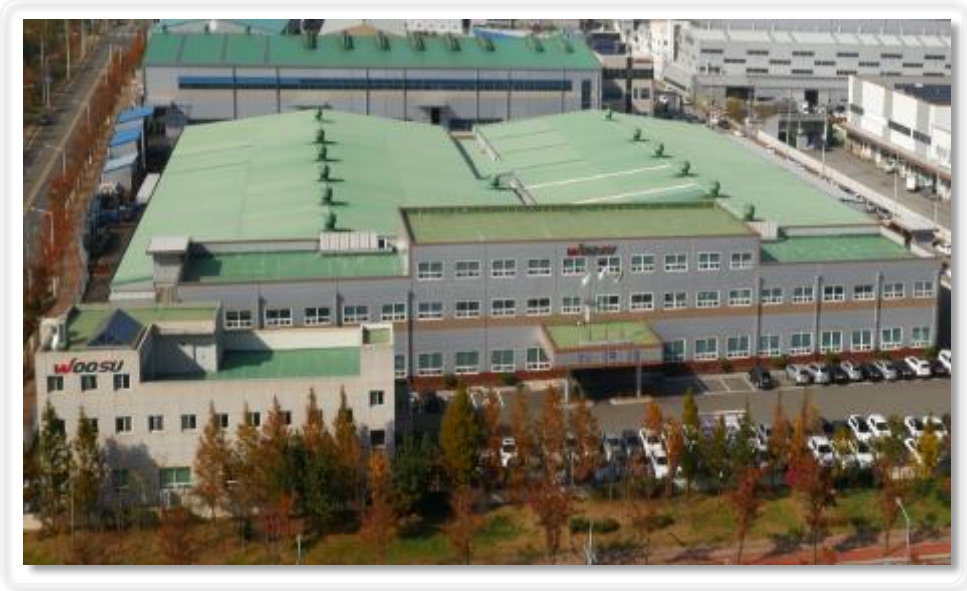


Die-Casting M/C



Equipment		Maker	Ton	Qty	Capacity/Year
Die-Casting Machine	D/C	TOSHIBA	800	5	2,250,000
		TOSHIBA	650	4	1,800,000
		TOSHIBA	350	2	1,800,000
	Total			11	5,850,000
H/Q	Solution Treatment	MAXRO	1.5	2	2,520 ton
	Aging	MAXRO	1.5	2	1,752 ton
		MAXRO	3	1	2,160 ton
		Total		5	6,432 ton

2-6. Woosu Precision _ Introduction



Foundation	5 Sep 2007 / Ulsan Korea	
Major Customers (Share)	HKMC	93.8%
	Doosan Infracore	2.2%
	LSMtron/Daedong	0.6%
	Others	3.4%
Sales (1 Million USD)		

CSC

Fork Rail ASSY

Parking ASSY

Parking Sprag

Parking Rod ASSY

Rocker Arm ASSY







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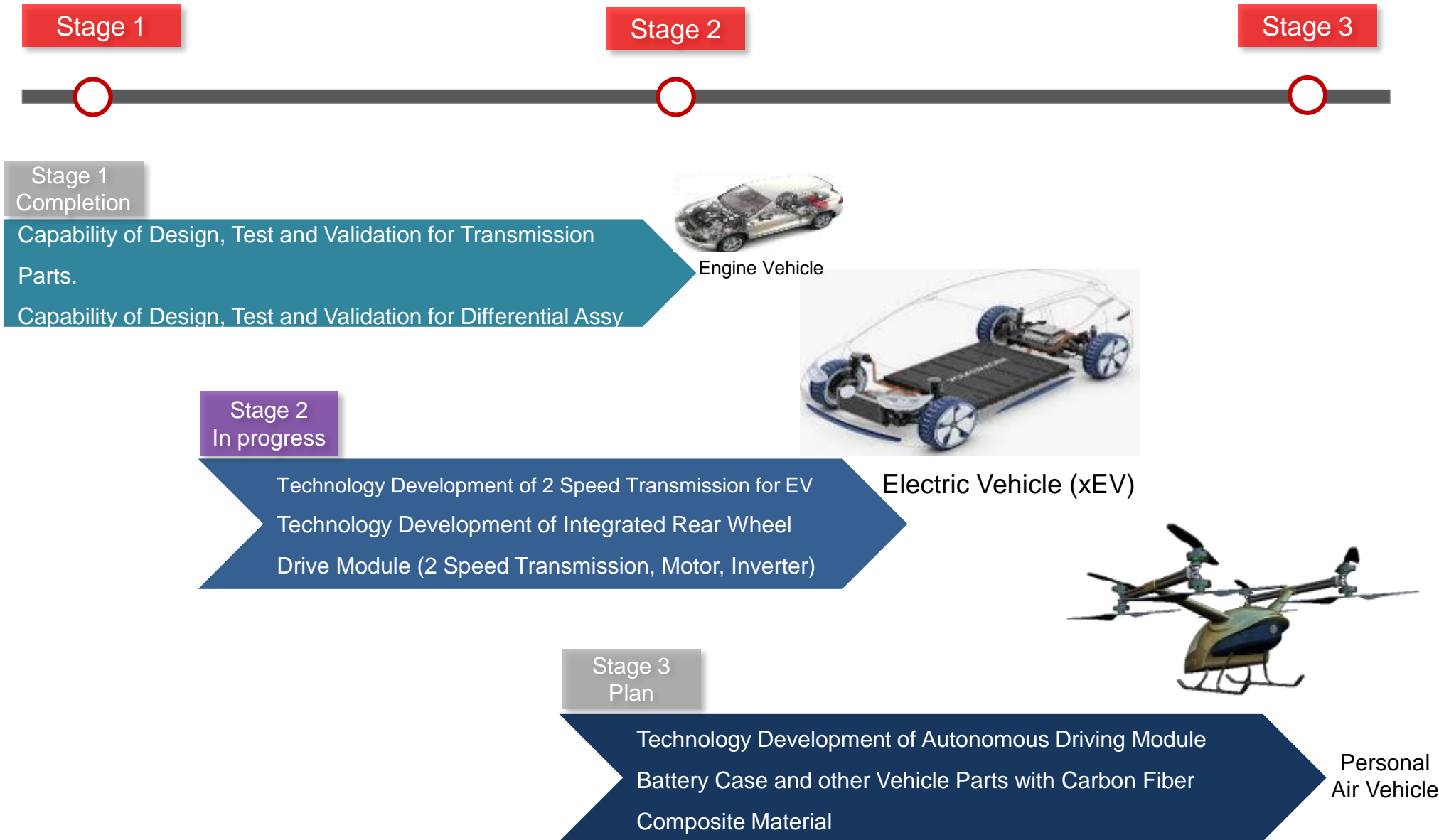
3-1. R&D Center _ Introduction



Foundation	6 Mar 2000 / Changwon Korea
Certificate	IATF-16949:2016
	OHSAS-18001:2007
	ISO-14001:2004
	CSR Assessment
	BIQS
Patent	Heli-Coil Inserting Device

History of Research and Development		Duration	Superintendence
1	 Development of Integral Rear Wheel Drive Module for xEV by reducing 3% of Energy Consumption	2020~2023	Government Project
2	 Design & Development of PSA MB6 Shifting System	2017~2020	PSA AVTEC
3	 Design & Development of PSA MB6 Fork System	2017~2020	PSA AVTEC
4	 Design & Development of Air Compressor (238cc)	2009~2013	HMC

3-2. R&D Center _ Technology Road Map



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*The First company to localize Micro EV
Components.*

Woosu Technology Micro Mobility



4-1-1. Information _ Summary and Organization Chart

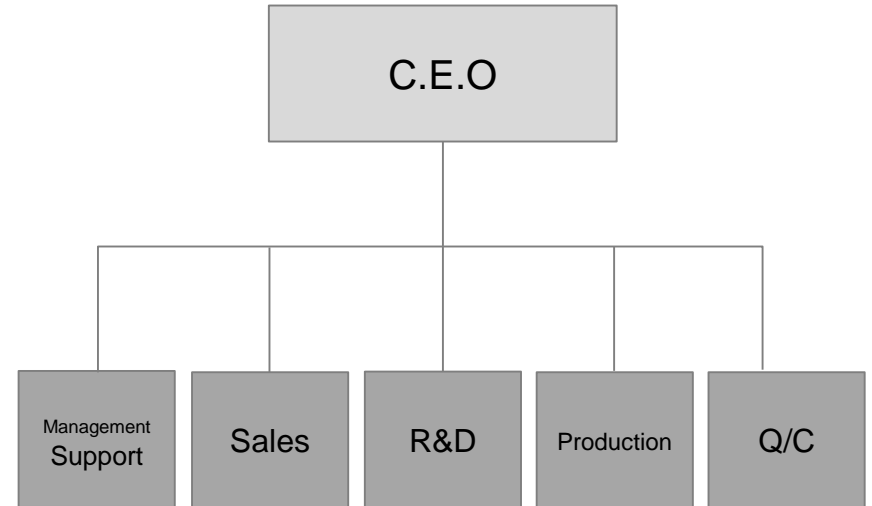
Summary

Company Name	Woosu TMM Co., Ltd.
Foundation	2018
C.E.O	Jong-Sang, Noh
Type of Company	Venture Company
Employee	16 Persons(Q3 2020)
Main Business	Developing, Producing and Sales of EV
Capital	USD 455,000
Address	Jongga-ro 362-11, Green car Technology Center 903 Jung-gu, Ulsan, Korea

Shareholders



Organization Chart



·Finance	·Order	·Design	·Components	·Q/A
·Account	·Purchasing	·Analysis	·EV	·A/S
·General Affairs	·Sales	·Validation	·System	
	·Advertisement		·Module	

4-1-2. Company History

Global leading Company in Micro EV Industry



2018.03

- Establishment of TMM

2018.08

- Registration as Vehicle Manufacturer

2018.10

- Participation in Country Innovation R&D Project

2019.09

- Excellent Design Award (Urban)

2020.01

- Registration of EV Design
- Registration of Panel Instrument Design for Vehicle

2018.06

- Registration of Annex Research Institute

2018.09

- Participated in Ulsan City Demonstration Project for EV

2018.12

- Development of Micro EV

2019.12

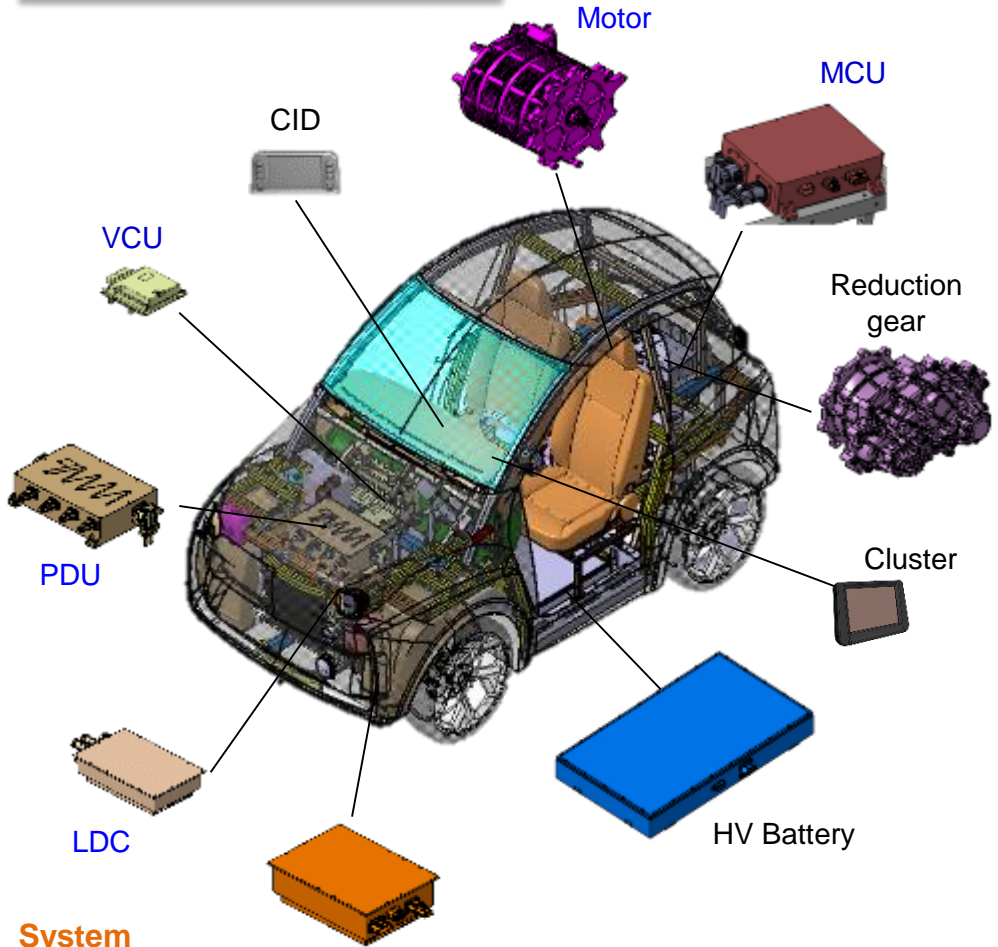
- Merged by Woosu Group

2020.06

- Changing Company Name (Woosu TMM)
- MOU with Ulsan City for Invigorating Industries of Micro EV

4-1-3. Major Components of Micro EV

❖ Major Components



Driving Module
▷ Motor+Inverter

- System**
- ▷ Driving Module + PDU **OBC**
 - ▷ Driving Module + LDC
 - ▷ Driving Module + LDC + VCU
 - ▷ Driving Module + VCU

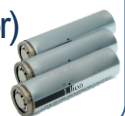
VCU: Vehicle Controller Unit
 PDU: Power Distribution Unit
 LDC: Low Voltage Converter
 OBC: On Board Charger
 MCU: Motor Control Unit

❖ Vehicle Specifications

Sort	Standard	TMM
Size	Below 3600*1500*2000	2710*1485*1560
Max Rated Output	Max. 15kw	Max. 15kw
Weight	Max. 600kg	Max. 600kg
Max Speed	Max. 80km/h	77km/h
Gradability	-	25%(GVW)
Driving Distance on a Single Charge	-	140km(MCT)

❖ Features

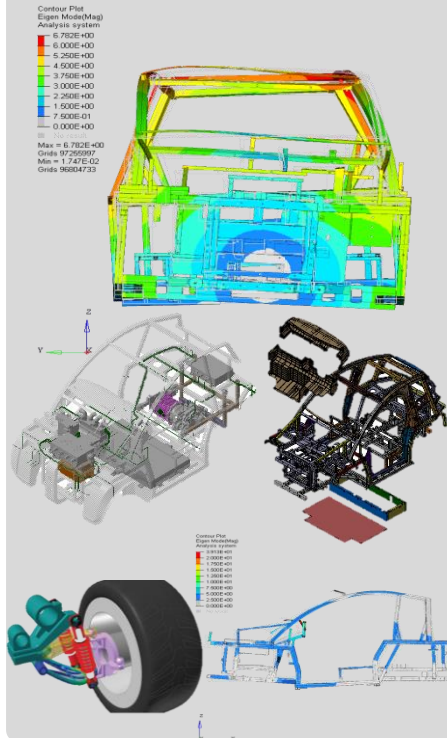
- Control Algorithm at the level of fully built Vehicle
 - └ Limp Home Mode, Regenerative Brake/Charging, Safety Control Mode Etc.,
- Localization System(Increasing Durability)
 - └ Driving Module(Motor + Inverter + 2 Speed Transmission)
 - Charging System(OBC + LDC)
 - Vehicle Control(VCU + PDU)
- Driving Distance(Optimized Heating Design for 15kw Motor)
 - └ 10kw Battery : 140km on a single charge.



4-1-4. Major Technology of Micro EV

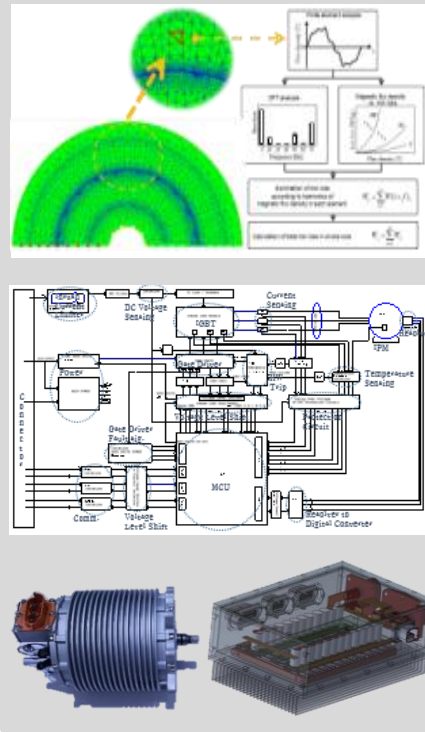
Micro Electric Vehicle(e-Mobility) Total Solution

Dynamic design



Optimized Dynamic Design
(Weight, Wheel, Motor Etc.)

Developing Motor/Inverter



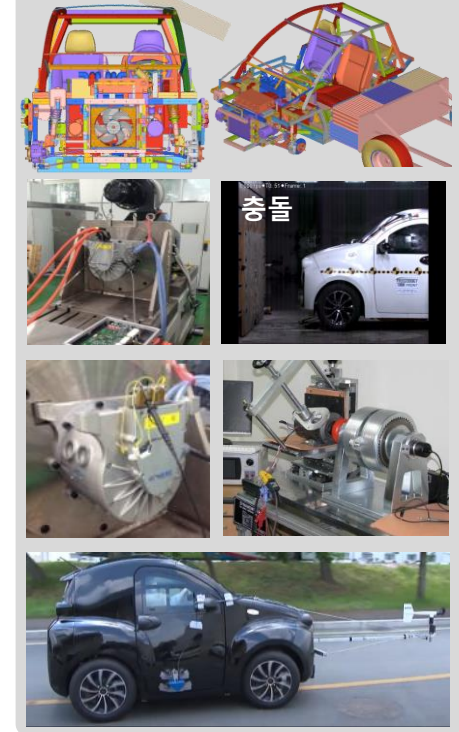
Developing Motor/Inverter
for real driving Vehicle

Producing E/V and Module

















Assembling and
producing EV & Module

Durability/ Environment Test



Systemizing and Testing
Environment Durability
System

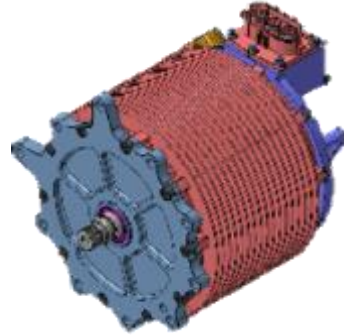
4-1-5. Major Components of Micro EV

Sort	Fig.	Driving Module		Note
		Motor	Inverter	
General E/V		110kw 	120kw 	
Micro E/V		15kw 	20kw 	Rear Car was produced
Electric Cart		5kw 	6kw being developed	
Electric 3 wheeled Car		3.5kw 	5kw being developed	Producing 10,000 parts
Electric Scooter		1.5kw 	2kw being developed	
Electric Wheel, Kick Board		0.5~1.0kw 	1.2kw being developed	

4-1-6. Major Components

15kw Driving Motor

- For Micro EV
- Capacity: 15kw(Efficiency: 95%)
- RPM: 6,000
- Permanent Magnetic Motor
- Air-Cooling



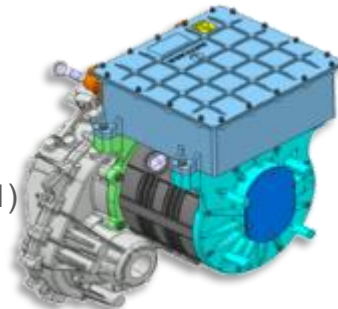
110kw Driving Motor

- For EV
- Capacity: Max 110kw(Efficiency: 95%)
- RPM: 11,500
- National Developing Project (RE-EV)



110kw Driving Module

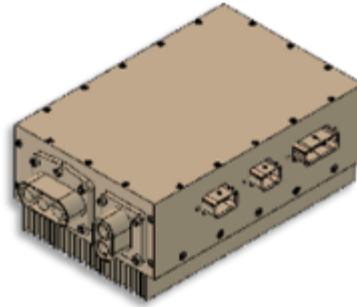
- For EV
- Capacity: 110kw (Efficiency: 95%)
- Integral Rear Wheel Driving Module (3 in 1)
- Durability Test: 500hr



4-1-7. Major Components

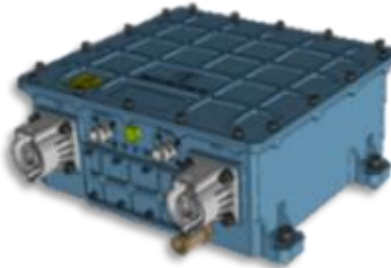
20kw Inverter

- For Micro EV
- Capacity: 20kw(Efficiency 95%)
- Voltage: 60 ~ 200v
- Temperature : -40 ~ 125°C
- Air-Cooling



120kw Inverter

- EV
- Capacity: Max 120kw(Efficiency 96%)
- Communication: CAN 2.0
- National Developing Project (RE-EV)

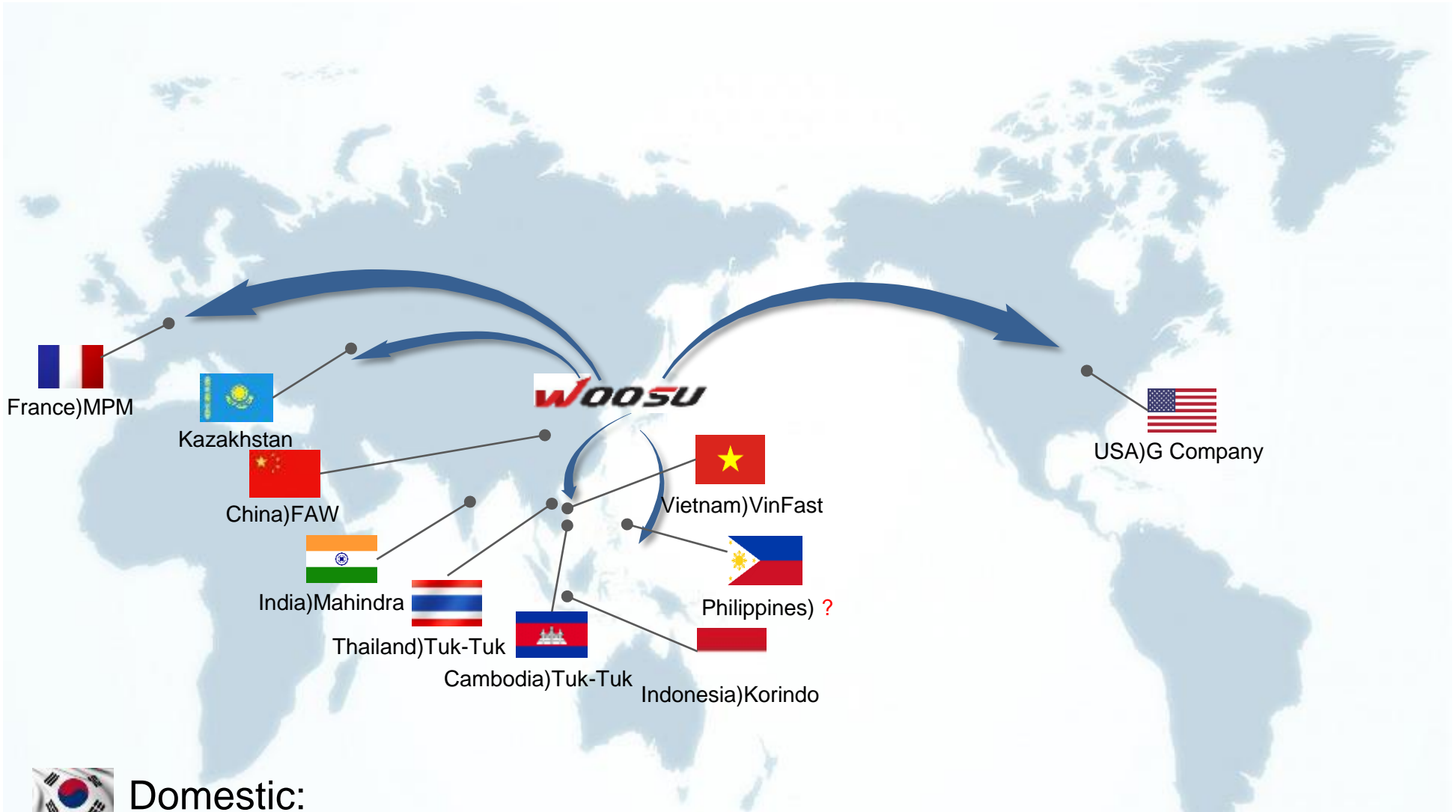


10kw Air compressor

- For Fuel Cell Car
- Output: 10kw(Efficiency 95%)
- RPM: 100,000
- PEMFC Project
- Joint Development with HMC



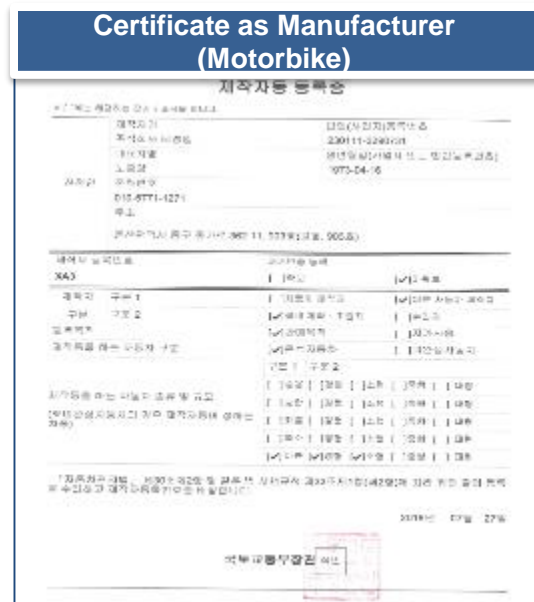
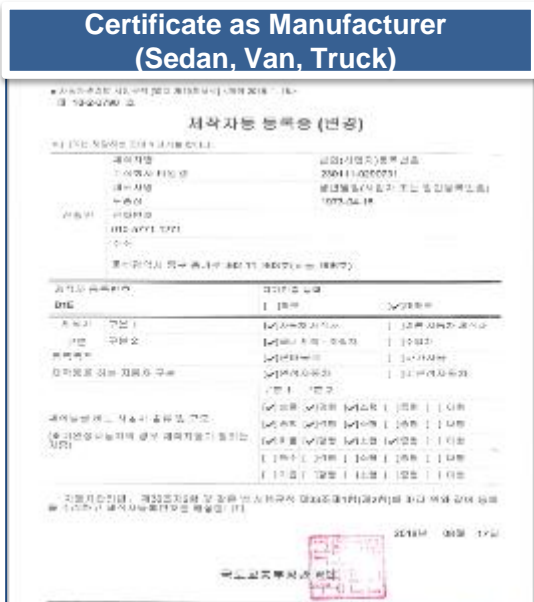
4-1-8. (Micro EV) Customers



Domestic:



4-1-9. Certificates and Awards for Micro EV



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